Vol 11(1) (2022): 41-48
DOI: http://dx.doi.org/10.24235/sc.educatia.v11i1.10115

SCIENTIAE EDUCATIA: JURNAL PENDIDIKAN SAINS

http://www.syekhnurjati.ac.id/jurnal/index.php/sceducatia

Low Carbon Education: How is Its Existence in Schools?

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article info

Article history:
Received: 17 March 2022
Received in revised form: 19 April 2022
Accepted: 20 June 2022
Available online: 30 June 2022

Keywords:
Low carbon education
Science education
Environmental learning
*Adiwiyata p*rogram

abstract

This research aims to investigate how is the teacher's understanding of Low Carbon Education (LCE) concept explicate and implicit, the implementation of environmental education that has already implemented, implementation of the adiwiyata program. This research used a survey method of the 58 teachers of elementary school, junior high school, and senior high school) in Kota Bogor. The instrument that is used is 76 questions included in the questionnaire about Low Carbon Education (LCE) comprehension, implementation in classes, and implementation of environmental education and green school program. Data are also taken by interviewing the teachers who have already done the environmental education teaching and learning in the classes and also the teachers who had already done the green school program (Adiwiyata). low carbon education terms have not been familiar explicitly in teachers at schools and also there is not a specific subject or topic in Indonesian curricula, while the low carbon education topics have already been integrated into Environmental learning which has been implemented in Indonesian curricula. The implementation of environmental learning at schools has in the good category, either pertaining with low carbon education concept or general. Research results is the implementation of environmental teaching materials also has already in good category. Besides that, the environmental practice pertaining low carbon education has been organized by the government for instance green school concept that led to Adiwiyata program for schools. Teacher understanding about that program has in great value which relate to teachers' attitude toward environment during and after that program.

1. Introduction

Environmental problems are one of the biggest things that people around the world have to face, including Indonesia (Joyce & Dzoga, 2011; Tati, Firman, & Riandi, 2017). Research conducted by Roy, Potter, and Yarrow (2008) has clearly explained problems related to the environment such as the excessive use of fossil fuels and the need for lower emissions. One of the most obvious consequences of environmental problems is the fact that at this time, the world is facing drastic climate change (Change, 2014). Discussions related to environmental issues are

closely related to the idea of low carbon. As explained by Yuan, Zhou, and Zhou (2011), the concept of low carbon itself has various meanings, each depending on the theoretical and pragmatic framework. However, all agree that despite different interpretations of the idea of low carbon, the main goal is to "reduce Greenhouse Gas emissions, exploit low carbon energy, and ensure economic growth" (Yuan, Zhou, & Zhou, 2011).

In fact, awareness of low-carbon activities has started from the traditions, culture, and local wisdom of the Indonesian people that have existed several centuries ago and are still present and preserved, but are not realized by the people themselves. However, the more advanced technology is, the more traditions are eroded, so that the current generation does not know some of these traditions. Thus, the development of low carbon is currently being carried out in the Global North countries such as in the UK (Roy, Potter, & Yarrow, 2008; Whitmarsh et al., 2011) or in Japan, as has been done by Shimada, Tanaka, Gomi, and Matsuoka (2007) and Su (2009). Similar research in Indonesia is still very limited despite the fact that Indonesia produced the equivalent of 1,453 gigatons of carbon dioxide ($GtCO_2$) in 2012 (Dursin, 2018). Although the government has launched a Low Carbon Development Framework, the problem caused by the lack of awareness of people to use low carbon materials remains (Pangestu, 2018). Previous research on low carbon has mostly approached it from an economic perspective. This is also supported by the government's program on low carbon in Indonesia, namely the Green Economy discussed by Low Carbon Development Indonesia (LCDI) which was initiated by BAPPENAS in collaboration with strategic ministries such as the Ministry of Environment, Ministry of Industry, Ministry of Agriculture, Ministry of Marine Affairs and Fisheries, the Ministry of Energy and Mineral Resources, and the Ministry of Finance (LCDI, 2021).

However, a low carbon or environmental perspective is also needed from an educational perspective. One of the failures in taking low-carbon initiatives is that most people have a lack understanding of the low-carbon problem itself (Moloney, Horne, & Fien, 2010). This is where education can play its role because education can be a bridge to build public awareness. There has been research on low carbon education in the educational environment. The research was carried out by Roy, Potter, and Yarrow (2008) which aims to develop a low-carbon education model in a higher education environment. Similar research within the scope of the university was conducted by (Dongfeng, 2010). Other research has been carried out in secondary schools, namely junior high school and senior high school (Çelikler & Aksan, 2016; De Leeuw, Valois, Ajzen, & Schmidt, 2015; Ho, Chen, & Hsu, 2017; Shealy et.al., 2017). However, this study uses the term environmental problem rather than low carbon problem. Especially in Indonesia, low carbon education terms still rare in curricula. They have already used environmental education in curricula with some topics which is related with low carbon education activities. In the other hand, the government also has already organized green school concept and adiwiyata.

The concept of green school in the learning curriculum is a strategy to preserve nature, so that the school environment becomes clean, healthy, beautiful and green by plants. Thus, learning activities are expected to be more conducive, and school residents (especially students) understand the values and importance of the benefits of environmental management for health and life sustainability in the present and in the future. Green school concept is organized to reach the goal of adiwiyata program. Adiwiyata program is based on two basic principles, as follows: (1) Participatory: schools community in this case must be actively involved in school management that covers the entire process of planning, implementing and evaluating according to responsibilities and roles they have; (2) Sustainable: All activities must be carried out in a structured and continuous manner in a comprehensive manner, through eight Adiwiyata's program is expected to become school residents who take part in school activities towards a healthy, clean and able to face environmental problems that may occur (Desfandi, 2015). Based

on the description, this research aims to investigate how is the teachers understanding about LCE concept explicate and implicit, the implementation of environmental education that has already implemented, implementation of adiwiyata program.

2. Method

This research used survey method to the 58 teachers of elementary school, junior high school, and senior high school) in Kota Bogor. The instrument that is used is 76 questions include in questionnaire about Low Carbon Education (LCE) comprehension, implementation in classes, and implementation of environmental education and green school program. Beside the questionnaire, there were an interview to the teachers who has already done the environmental education teaching and learning in the classes and also the teachers who had already done the green school program (Adiwiyata). Data analysis are done by the descriptive analysis. The data from questionnaire are proceed by calculating based on the mean from respondent's answer.

3. Result and Discussion

Teachers understanding pertaining low carbon education concept

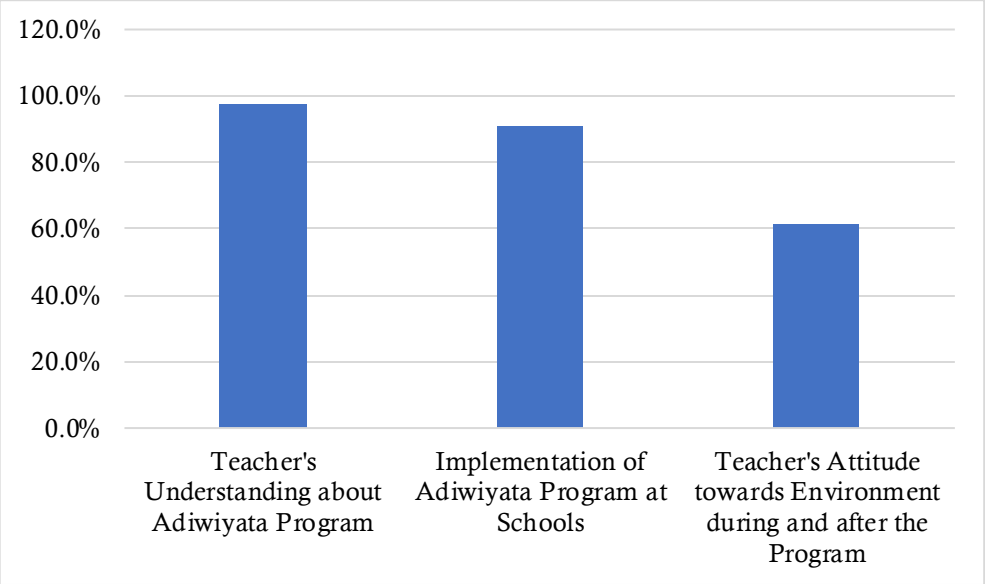

Figure 1. Teacher understanding about LCE explicitly and implicitly

Figure 1 shows that most of teachers do not know pertaining Low Carbon Education terms explicitly. Some teacher really do not understand about Low carbon Education terms, while the others said that they already knew pertaining low carbon term, but in economic area. This is normal because the government is aggressively launching a green economy with the term low carbon economy through Low Carbon Development Indonesia Program (LCDI). Nevertheless, implicitly teacher did not realize that they has already knew about Low Carbon Education concept itself. Low Carbon Education is a part of environmental education that include in green house effect, energy saving, renewable energy, and etc. Those topics and activity, has already input in Indonesian Education Curricula. Those already implemented in teaching and learning at classes for every level of education such as elementary school, junior high schools, and senior high schools, until higher education.

The implementation of low carbon education in teaching and learning

The implementation of low carbon education that include in environmental education has greater value. It means that several activities and topics in environmental education has relation with low carbon education. So, it does not mean that the terms of LCE and its activities has not been implemented in the classroom. It is only implicit activities in other terms of program. But there are the differences between LCE and Environmental education. The Environmental education tend to biological area, such as biodiversity, environmental pollution with biological point of view, and etc. Meanwhile, LCE tend to how the carbon cycle and carbon travel from an activity that can be exposed to atmosphere and caused the green house effect and make climate change dramatically. This concept has not been taught in a focused manner to students to reduce the impact of extreme climate change with a low carbon understanding. The biggest disaster today is not only covid 19, but there is a lurking disaster, namely climate change caused by carbon emissions.

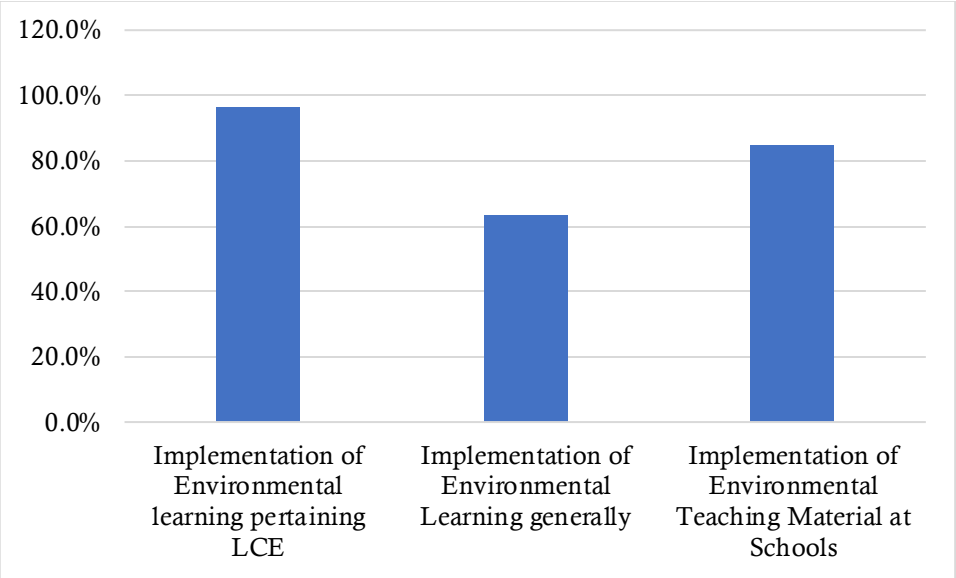

Figure 2. Implementation of LCE at Schools

Although LCE has not been taught in a focused manner in schools, environmental learning has been implemented. So that students' awareness of the environment is still maintained. The implementation of environmental learning in schools, since 2019 has been integrated with other subjects, in general, namely natural science subjects. Some of them are local subjects. This is reinforced by the results of an interview with one of the teachers, namely that environmental subjects have been abolished and even certified teachers are now integrated with natural science learning. Based on Surat Keputusan Menteri Pendidikan dan Kebudayaan No. 008C/U/1975, environmental education is taught not in the form of separate subjects, but in the form of a unit with certain subjects and fields of study through an integrated approach. From Figure 2, shows that the implementation of environmental learning at schools actually represent the low carbon education activities. It is caused the integration of environmental learning with the other subject such as science subject.

In implementation of environmental education at classes, the learning media and teaching material that is used has already sufficient. The instructional implementation of environmental education has done inside and outside the classroom by differences method of learning, for instance observation, give the students project based on the environmental problem for example brings the plant to school in order to make the school more beautiful; making a poster, giving a

solution pertaining environmental problem through argumentation and discussion, but there is still the bigger responds pertaining fill the students worksheet and the evaluation still using multiple choices and essay based on the book that they have already read. It means students do the evaluation only based on the concept. Whereas, the environmental learning, if the course are implemented in daily life, it would give the implication as a result of our action to the world around us in small or large form (Macnaghten, 2003; Matson, Clark, & Andersson, 2016).

The implementation of adiwiyata program at school

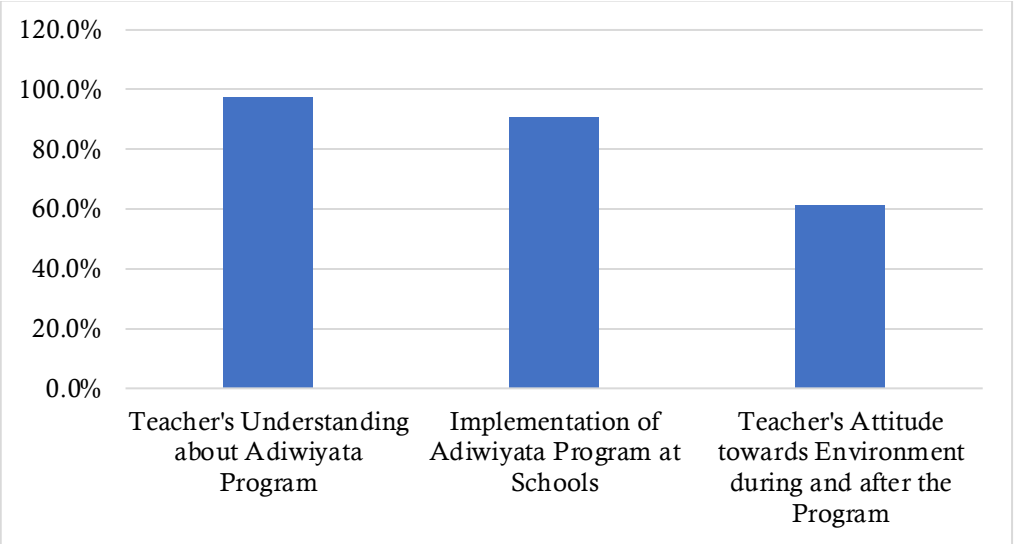

Figure 3. Implementation of adiwiyata program and green school concept at schools

The adiwiyata program is implemented only for schools designated by the region. Beginning from district, regional, regency, province, then national. The schools compete each other to reach the best school in environmental aspect with eight categories of adiwiyata program. So that, the implementation of adiwiyata program and green school concept has already done in several schools. The teachers also has great understanding pertaining the program and concept. It is shown from the results of Figure 3. It also has an effect on the teacher's attitude towards the environment, and can teach it to his students. The results show that teacher's attitude has already in a very good category. Teachers attitude toward environment has great value based on the responses. Also strengthen based on interview that teachers with the principal initiate the program for students as an agent of change which has representative form each class who supervise their mate to protect the environment such as throw the trash on the proper places, always clean the classroom based on schedule. There also has the places for recycle the trash become compost, and also green canteen which is allowed students used their own cutlery. The teachers said that it is only run well when the adiwiyata program is ongoing. Besides that, after adiwiyata program over, sometimes the infrastructure are not maintained well, the program pertaining environmental are forgotten. While in other school which is private school, there also the infrastructure changing after they follow adiwiyata program, for instance there are green open spaces in school, green canteen without Styrofoam, plastic, and the material which difficult to reduce, the interior of classes has open spaces which has good air circulation, and also teachers has community to recycle used cooking oil (*minyak jelantah*) become a fuel for motorcycle at school with the students and their community outside school. Teacher said that there is always a budget allocation for environmental activities every semester, so the program and infrastructure are maintained well.

Whereas, the adiwiyata program is a reflection of the implementation, understanding, and environmental awareness shared between stakeholders, students, and parents of students. This is also a reflection and there are several linkages between activities and reducing the amount of carbon emissions that can save the environment from the field of education which in this term we can call low carbon education.

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4. Conclusion

Based on the results above, it can be concluded that low carbon education terms have not been familiar explicitly in teachers at schools and also there is not a specific subject or topics in Indonesian curricula, while the low carbon education topics has already integrated in Environmental learning which has been implemented in Indonesian curricula. The implementation of environmental learning at schools has in good category, either pertaining with low carbon education concept or general. The implementation of environmental teaching materials also has already in good category. Besides that, the environmental practice pertaining low carbon education has been organized by the government for instance green school concept

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Acknowledgments

We thank to Indonesian Ministry of Education, Research, and Technology, Puslapdik, and LPDP that has funding this research which is include in scholarship as *Beasiswa Pendidikan Indonesia* scheme according to grant Doctoral Study.

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